BACKWARD WAVE OSCILLATOR REGIME OF WHISTLER CYCLOTRON INSTABILITY IN AN INHOMOGENOUS MAGNETIC FIELD

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We present the linear theory for the backward wave oscillator generation regime of whistler waves in the Earth's magnetosphere. Using a parabolic profile of the magnetic field and a linear expression for the resonant current in the case of a zero order distribution function with a step discontinuity in the velocity component parallel to the magnetic field, we investigated the modes of the system by means of a search procedure. The existence of at least one mode exponentially growing in time is indicative of absolute instability, and such modes have been found. Therefore, earlier prediction of such a regime, based on the homogeneous magnetic field model, is confirmed. The dependence of growth rates on the frequency mismatch and energetic electron density has been studied. These results yield the characteristic spatial profile and temporal growth rate of small-amplitude whistler-wave disturbances, which are likely to be the seeds for chorus emissions.